FOMIN, P.I.

Radiative corrections to pair photoproduction. Zhur. eksp. i teor. fiz. 48 no.3:992-994 Mr '65. (MIRA 18:6)

1. Fiziko-tekhnicheskiy institut AN Ukrainskoy SSR.

L 23004-66 EWT(m)/T

ACC NR: AP6009721 SOURCE CODE: UR/0386/66/003/004/0190/0192

AUTHOR: Fomin, P. I. 69 B

ORG: Physicotechnical Institute, Academy of Sciences, Ukrainian SSR (Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR)

TITLE: Concerning the possible role played by gravitation in the problem of the mass of an elementary particle 19

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 4, 1966, 190-192

TOPIC TAGS: gravitation effect, quantum field theory, elementary particle, superconductivity, electromagnetic interaction

ABSTRACT: After pointing out that modern quantum field theory is presently incapable of expressing the masses of elementary particles in terms of the interaction constant and the universal constants, mainly for lack of a constant with the dimension of length or an equivalent constant, the author presents an argument in favor of an affirmative answer to the old fundamental question whether allowance 2

Card 1/2

L 23004-66

ACC NR: AP6009721

for gravitation and for the gravitational constant γ can solve this problem. It is shown, in particular, that the use of a dynamic model of elementary particles, based on an analogy with superconductivity, such as proposed by Y. Nambu and G. Jona-Lasinio (Phys. Rev. v. 122, 345, 1961) calls for involvement of a length of precisely the order of magnitude (1.38×10^{-34} cm) which would be constructed if γ were to be taken into account. Confining himself to the electromagnetic interaction, and expressing the masses of the electron and of the nuon in terms of the universal constants c, $\hbar$, e, and certain length L, the author derives two expressions for the electron mass, based on the use of one of the two proposed lengths, and shows that the two expressions behave differently when $\hbar \to 0$, one remaining constant and the other diverging. This means that the classical analysis provides the choice between the lengths. A final expression is presented under the assumption that only the field outside the singular surface takes part in the creation of the field mass of a charged particle. This expression coincides, apart from a coefficient, with an empirical formula previoulsy given by I. G. Ivanter (ZhETF v. 36, 1940, 1958). Orig. art. has: 7 formulas.

SUB CODE: 20/ SUBM DATE: 14Jan66/ ORIG REF: 001/ OTH REF: 001

Card 2/2 pla

BAGRATUNI, G.V.; BOL'SHAKOV, N.N.; BRUYEVICH, N.I.; BUBNOV, I.A.; GRAMENITSKIY, D.S.; IZOTOV, A.A.; MAZMISHVILI, A.I.; MODRINSKIY, N.I.; SALYAYEV, S.A.; FLORENT'YEV, V.B.; FOMIN, P.M.

Nikolai Fedorovich Bulaevskii; obituary. Izv.vys.ucheb.zav.; geod.i aerof. no.6:121-122 '61. (MIRA 15:3)
(Bulaevskii, Nikolai Fedorovich, 1882-1961)

L 65137-65 EWT(m)/EWP(w)/EPF(c)/EWP(v)/T/EWP(k)/ETC(m) WW/EM/DJ

ACCESSION NR: AP5021611 UR/0286/65/000/013/0078/0079

AUTHOR: Fomin, P. M. 44,55

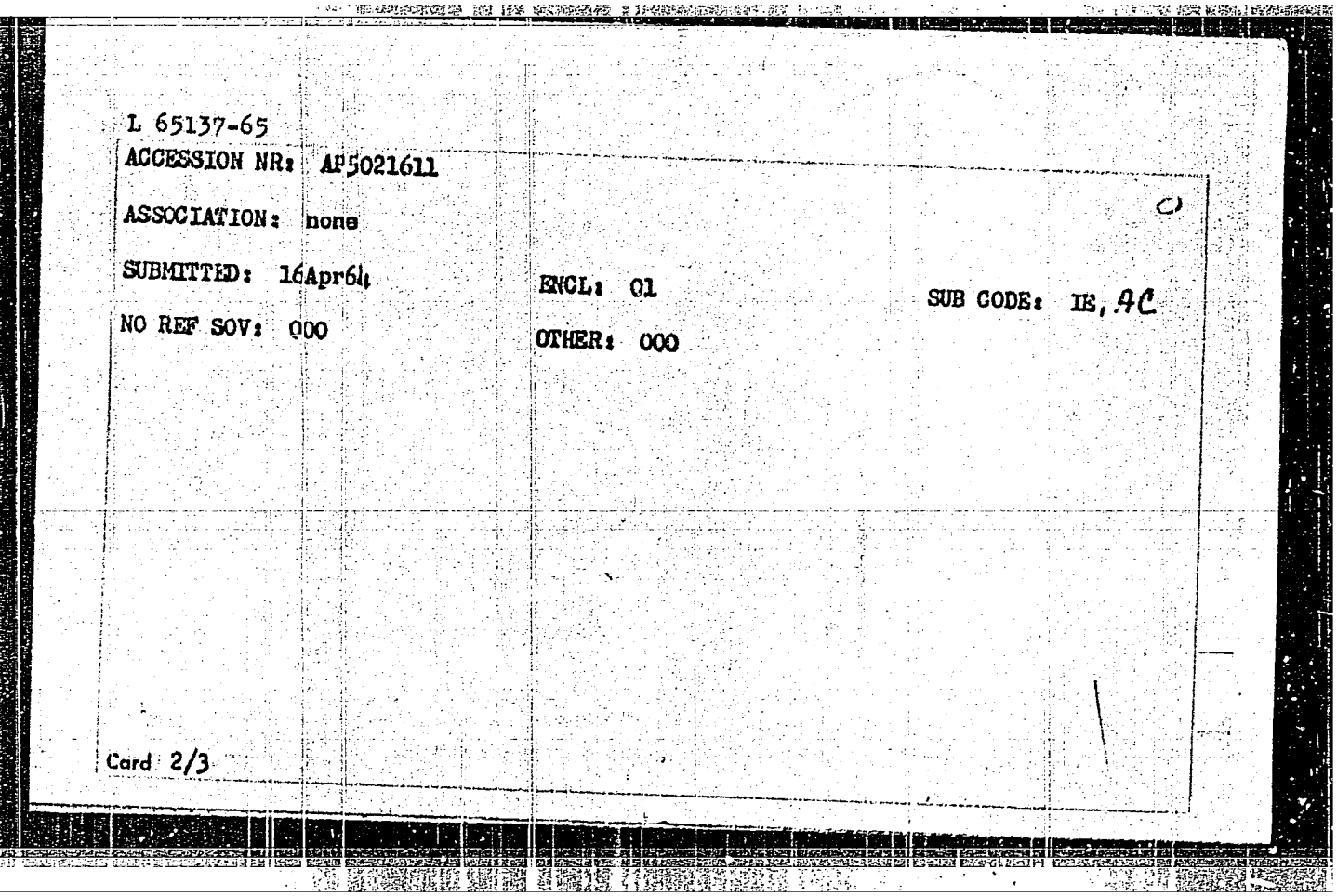
TITLE: Airfield device for determining the loss of oil in the control channels of air propellers. Class 42, No. 172523

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 13, 1965, 78-79

TOPIC TAGS: measuring instrument, engine lubricating system, lubricating oil, turboprop engine

ABSTRACT: This Author Certificate presents an airfield device for determining the loss of oil in the control channels for air propellers of turboprop aircraft. The device contains an oil tank, pump, distributing cocks, and pipes (see Fig. 1 on the Enclosure). To improve the accuracy of determining the oil loss in the control channels and to ascertain the condition of the control system of air propellers, the device is provided with a hydraulic cylinder and a piston whose rod carries a cam connected through a microswitch to an electrical chronometer. The latter determines automatically the time spent in forcing through a given volume of oil. Orig. art. has: 1 figure.

Card 1/3



L 65137-65
ACCESSION NR: AP5021611

ASSOCIATION: none

SUBMITTED: 16Apr64 ENCL: 01 SUB CODE: IE, AC

NO REF SOV: 000 OTHER: 000

Card 2/3

L 65137-65

ACCESSION NR: AP5021611

ENCLOSURE: 01

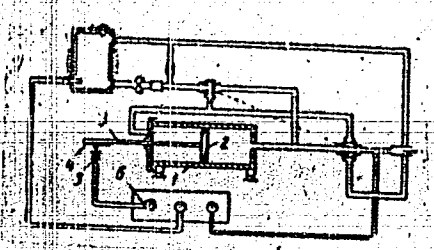


Fig. 1. 1- hydraulic cylinder; 2- piston; 3- rod; 4- tension mechanism; 5- dynamometer

Card 3/3

L 34853-66 EWT(1)

ACC NR: AP6021790 SOURCE CODE: UR/0413/66/000/012/0056/0056

INVENTOR: Fomin, P. P.

ORG: none

TITLE: Phase sensitive full-wave rectifier. Class 21, No. 182791

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 12, 1966, 56

TOPIC TAGS: electronic rectifier, rectification

ABSTRACT: A full-wave phase-sensitive rectifier consisting of a signal transformer and a reference voltage transformer is reported. The secondary windings of both

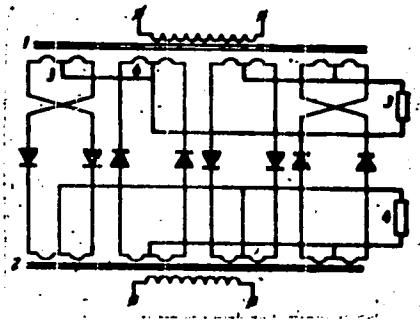


Fig. 1. Full-wave rectifier

1 - Signal transformer; 2 - reference transformer; 3 - load resistance; 4 - ballast resistance.

Card 1/2 UDC: 621.314.69

L 34855-66

ACC NR: AP6019639

superoperational storage, the location of AU registers in this storage would only slightly increase the time of carrying out the commands; it would ensure highly flexible programing which may enhance the overall speed of the computer. Orig. art. has: 3 figures and 3 tables.

[03]

SUB CODE: 09 / SUBM DATE: none/ ATD PRESS: 5031

Card 2/2

ACC NR: AP7002042 (A,N) SOURCE CODE: UR/0413/66/000/023/0187/0187

INVENTOR: Fomin, P. P.; Peschanskiy, Yu. A.

ORG: None

TITLE: A two-reading instrument for measurement of time intervals with conversion to digital code. Class 42, No. 122770

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 23, 1966, 187

TOPIC TAGS: analog digital encoder, circuit delay line, time measurement, coincidence circuit, computer coding, flip flop circuit

ABSTRACT: This Author's Certificate introduces: 1. A two-reading instrument for measurement of time intervals with conversion to digital code. Measurement accuracy is improved by using a diode coding matrix in the exact readout system. This matrix operates in conjunction with a delay line, converting the number of the tap to digital code where the pulse terminating the time interval coincides with a generator pulse retarded in the delay line. 2. A modification of this instrument in which the measurement is done by generator pulses which are not synchronized with the pedestal pulses of the time intervals. Rectifier switches are used to transfer the elements in the exact readout system from measurement of the interval between the generator pulse and the pulse which terminates the interval to be measured. The results of measurements of both intervals are added by connecting a parallel summation unit to the output of

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ACC NR: AP7002642

the diode matrix. All digits in this summation unit except the highest are used as the exact readout digits. Actuation of the highest digit is fixed in the rough readout counter. 3. A modification of this instrument designed for eliminating false readings in the case where pulses in two adjacent taps of the delay line simultaneously coincide with the pulse terminating the time interval. The device utilizes a diode switch controlled by a flip-flop which is disconnected with the first coincidence of a pulse entering the delay line, and cuts this pulse off from the common input of the coincidence circuit.

SUB CODE: 09/ SUBM DATE: 16Feb59

Card 2/2

FOMIN, P.S.

"Gearboxes" by I.I.Dymshits. Reviewed by P.S.Fomin. Avt.prom. 27 no.8:47 Ag '61. (MIRA 14:10)

1. Moskovskiy avtozavod imeni Likhacheva.
(Motor vehicles—Transmission devices)
(Dymshits, I.I.)

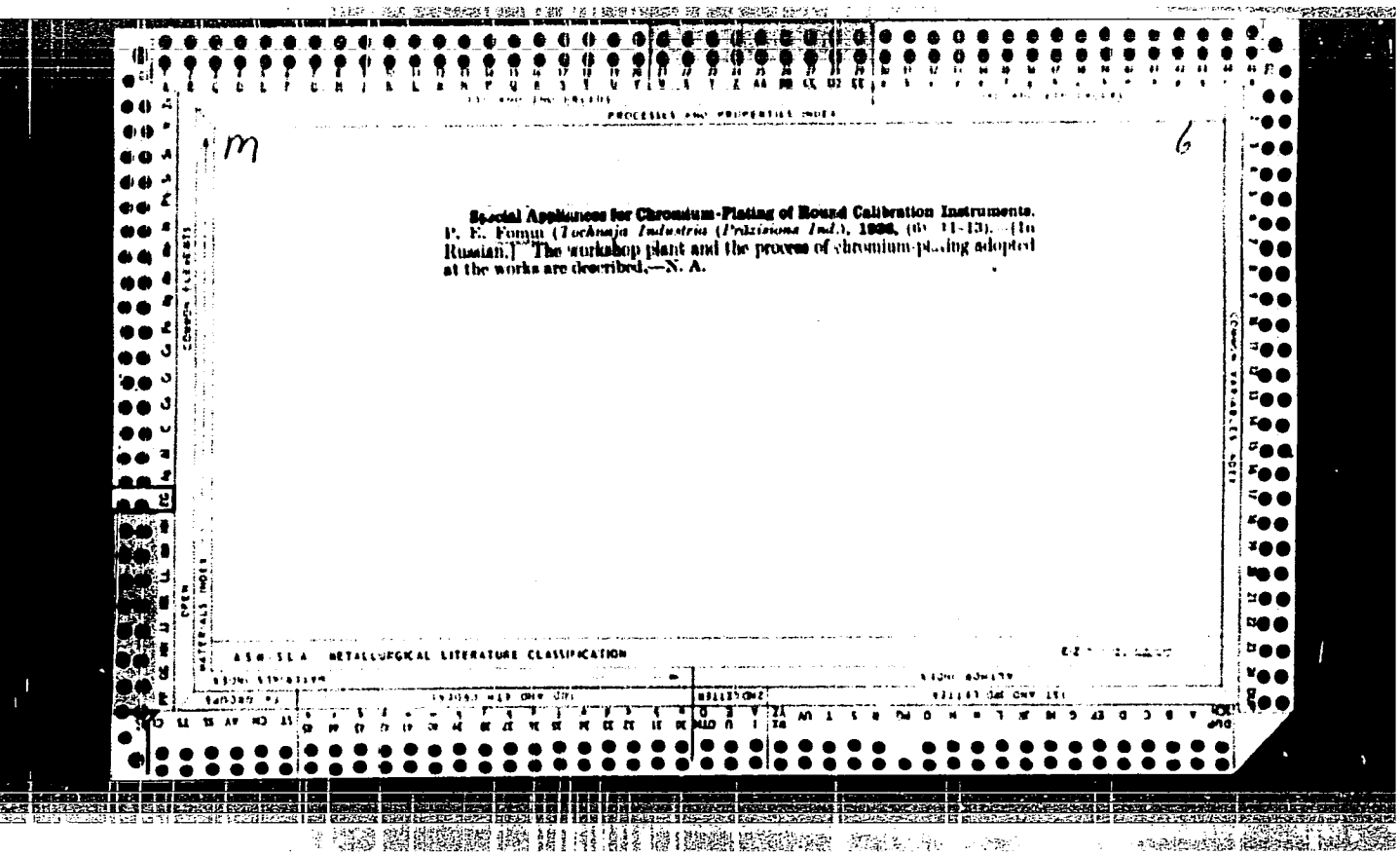
FOMIN, P.S.

Review of P.M.Khel'dt's book "Automobile clutches and gearboxes."
Avt.prom. 29 no.9:48 S '63. (MIRA 16:9)

1. Moskovskiy avtozavod imeni Likhacheva.
(Automobiles—Transmission devices)
(Khel'dt, P.M.)

FOMIN, Petr Vasil'yevich; MEDVEDEVA, L.V., red.; ZAYTSEVA, L.A., tekhn. red.

[Public university of industrial hygiene] Obshchestvennyi universitet okhrany truda. Moskva, Profizdat, 1963. 62 p. (MIRA 16:8)
(Zaporozh'ye--Industrial hygiene--Study and teaching)



m

6

Special Appliances for Chromium-Plating of Round Calibration Instruments. P. E. Fomin (*Tochnaja Industria* (*Priborostroenie Ind.*), 1936, (6) 11-13). [In Russian.] The workshop plant and the process of chromium-plating adopted at the works are described.—N. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

MA

18

Emulsion with Sulphurised Axle Oil No. 8 for the Working of Aluminium. P. Ye. Fomin (*Aviapromn. (Air Ind.)*, 1939, (1), 55; *Chem. Zentr.*, 1940, 111, (1), 3982).—[In Russian.] In the machining of light metals, a new emulsion is recommended for use instead of petroleum, consisting of 5% sulphurized (0·5% sulphur) axle oil, 5% turpentine, 15% Emulsol, and 75% water.

1943

FOMIN, P. Ye.

"Time Saving in Turning Outside Diameters of Tubes," Stanki i Instrument, 10, No. 8, 1939.

Report U-1505, 4 Oct 1951.

FOMIN, P. Ye.

"A Apecial Prism for Grinding Key Gauges," Stanki i Instrument, 10, No 12, 1939.

Report U-1505, 4 Oct 1951.

FOMIN, P. Ye.

Leningrad

"An Attachment for Centerless Grinding on a Cylindrical Grinding Machine" Stanki i Instrument, 12, No. 1, 1941.

Report U-1503, 4 Oct. 1951.

FOMIN, P. Ye.

"An Emulsion for the Hydraulic Units of Metal-cutting Machine Tools.", Stanki I Instrument, 14, No. 11-12, 1943.

BR-52059019

FOMIN, P. Ye., Engineer

"Replacing Transformer Oil in Monofluxes (Monoflok-sakh) with a Special Lubricant Mixture." Stanki I Instrument Vol. 15, No. 3, 1944

BR 52059019

FOMIN, P. Ye., Engineer

"High-Quality Grinding of Thin-Walled Parts on a Magnetic Table Using a Rubber Cushion." Stanki I Instrument Vol. 15, No. 3, 1944.

BR 52059019

FOMIN, P. Ye.

"A Change in the Design of Blades (Nozh) in the Press-Shears of the Pel'a-5 Type."
Stanki I Instrument Vol. 15, No. 4-5, 1944

BR 52059019

FOMIN, P. Ye. Engineer

"Electrolytic Coppering of Hard Alloy Blades." Stanki I Instrument Vol. 15, No. 6, 1944.

BR 52059019

FOMIN, S.

Asal'chuk's machine. Znan.sila 30 no.11:9 N '55. (MLRA 9:1)
(Bottling machinery)

FOMIN, S., podpolkovnik, voyennyy letchik pervogo klassa; MALASAY, A., mayor, voyennyy letchik pervogo klassa

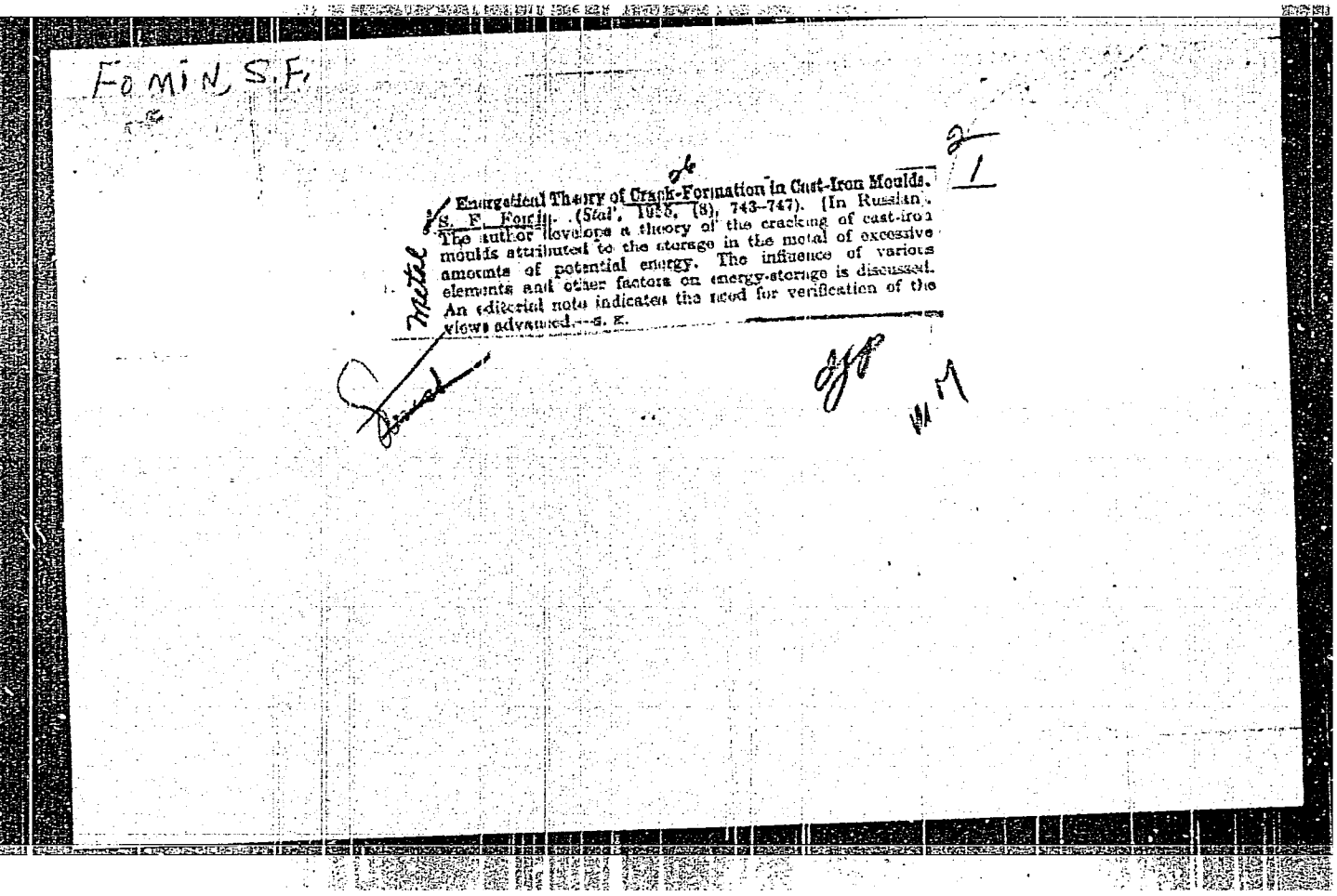
Eliminating errors. Av.i kosm. 45 no.4:40-44 Ap '63. (MIRA 16:3)
(Airplanes--Take-off)

FOMIN, S.F.

[Adjustment of automatic single-spindle automatic lathes, models 1112-1136] Naladka odnoshpindel'nykh tokarnykh avtomatov mod. 1112-1136. Moskva, Gos. nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1953. 182 p. (MLRA 6:8) (Lathes)

FOMIN, Sergey Fedorovich; STEPANOV, S.I., inzhener, retsenzent; KOLLI, A.Ya., inzhener, redaktor; TIKHONOV, A.Ya., tekhnicheskiy redaktor.

[Installing and adjusting turret lathes] Ustroistva i naladka tokarno-revol'vernykh stankov. Moskva, Gos.nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1955. 183 p. (MLRA 8:12)
(Lathes)



Fomin, S.F.

Energetical Theory of Crack-Formation in Cast-Iron Moulds. S. F. Fomin. (*Stal'*, 1938, (8), 743–747). (In Russian.) The author develops a theory of the cracking of cast-iron moulds attributed to the storage in the metal of excessive amounts of potential energy. The influence of various elements and other factors on energy-storage is discussed. An editorial note indicates the need for verification of the views advanced.—S. K.

Metal

KUL'BITSKAYA, A.Ya.; DVALI, G.S.; FOMIN, S.F.; EBRALIDZE, L.I.

Fast-drying, highly-resistant divider plates for easily-detachable risers. Lit. proizv. no.9:24 S '58. (MIRA 11:10)
(Foundry machinery and supplies)

FOMIN, Sergey Fedorovich; LIVSHITS, Sh.Ya., inzh., red.; SOKOLOVA, T.F., tekhn.red.

[Adjustment of the 1112-1136 and 1A112-1A136-type automatic lathes] Naladka odnoshpindel'nykh tokarnykh avtomatov mod. 1112-1136 i 1A112-1A136. Izd.2., perer. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1959. 280 p. (MIRA 13:2)
(Lathes)

FOMIN, Sergey Fedorovich, master tokarnogo uchastka; MOISEYEV, M.P., inzh., retsenzent; NEMIROVSKIY, E.I., inzh., red.; YAKOVLEVA, V.I., red.izd-va; EL'KIND, V.D., tekhn.red.

[Handbook for the foreman of a turning shop] Spravochnik mastera tokarnogo uchastka. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit. lit-ry, 1960. 256 p. (MIRA 14:3)
(Turning)

FOMIN, S.F.; SYSOYEV, V.I., kand. tekhn.nauk, dots., retsenzent; LESNICHENKO, I.I., red.izd-va; SMIRNOVA, G.V., tekhn.red.

[Attachments and auxiliary tools for lathes] Prisposobleniia i vspomogatel'nyi instrument k tokarnym stankam. Moskva, Mashgiz, 1963. 152 p. (MIRA 17:2)

FOMIN, S.F.; MALEVSKIY, N.P., inzh., red.; GARANKINA, S.P., red. izd-va; UVAROVA, A.F., tekhn. red.

[Manual for the foreman of a turning section] Spravochnik mastera tokarnogo uchastka. Izd.2., isp. i dop. Moskva, "Mashinostroenie," 1964. 299 p. (MIRA 17:3)

FOMIN, S.F., puteboy rabochiy

Inspectors' activity in a section. Put' i put. khoz. 8 no.5:22 My '64. (MIRA 17:6)

1. Stantsiya Mishkino, Yuzhno-Ural'skoy dorogi.

FOMIN, S.F., putevoy rabochiy

Production conferences. Put' i put. khoz. 8 no.10:11 '64.
(MIRA 17:12)

1. Stantsiya Kurgan, Yuzhno-Ural'skoy dorogi.

MISHUKOV, F.A., kand.tekhn.nauk; FOMIN, S.F., dotsent; USTINOV, A.I.

Bessemer pig iron in the machinery industry. Izv.vys.ucheb. zav.; mashinostr. no.7:174-181 '63. (MIRA 16:11)

1. Penzenskiy kompressornyy zavod. 2. Glavnyy metallurg Penzenskogo kompressornogo zavoda.

MISHUKOV, F.A.; FOMIN, S.F.; KOSTERIN, A.A.

Centrifugal casting of linear blanks. Lit. proizv. no.8:34-35 Ag '63. (MIRA 16:10)

FOMIN, S. G.

25919. FOMIN, S. G. Lechenie nekrvbatsilleza. Veterinariya, 1949, No. 8, S. 21-23.

So. Letopis' Zhurnal'nykh Statey, Vol. 34, Moskva, 1949

OYKS, G.N., doktor tekhn. nauk; BORODIN, D.I.; TSYKIN, L.V.; KAPUSTIN, I.V.; SOROKIN, A.A.; KUTSENKO, A.D.; ZAGREBA, A.V.; REKHLIS, G.N.; TRUSEYEV, A.I.; Prinimali uchastiye: GUBENKO, S.M.; FOMIN, S.I.; KUBLITSKIY, A.M.; SAF'YANOV, V.P.; VOLYNKIN, V.M.

Some problems in the hydrodynamics of a converter bath. Met. i gornorud. prom. no.3:29-31 My-Je '65. (MIRA 18:11)

FOMIN, S. S.

"Relating to the Problem of Managing the Boll Bearing of Cotton Plants." Cand Agr Sci, Inst of Agriculture, Acad Sci Uzbek SSR, Tashkent, 1953. (RZhbiol, No 4, Oct 54)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (10)

So: Sum. No. 481, 5 May 55

Ann. of Math. (2) 48, 568–640 (1947); these Rev. 9, 133; I. M. Gelfand and M. A. Naimark, Izvestiya Akad. Nauk SSSR. Ser. Mat. 11, 411–504 (1947); these Rev. 9, 495]. They show that in each of these representations the spectrum is a Lebesgue spectrum. Their results follow as a consequence.

From the above result follow the well-known theorems of Hopf and Hedlund on the metric transitivity and mixing properties of geodesic flows in 2- and 3-dimensional manifolds of constant negative curvature and finite volume. In the case $n=2$ the authors also prove by appealing to the study of automorphic forms that the spectrum of the flow is an enumerably multiple Lebesgue spectrum. In the last paragraph the authors discuss the group-theoretical scheme which lies at the basis of their proofs and its applications to coset spaces of some locally compact Lie groups.

Y. N. Dowker (London).

FOMIN, S. V.

Uber periodische untergruppen der unendlichen abelschen gruppen. Matem, SB, 2 (44), (1937), 1007-1010.

SO: Mathematics in the USSR, 1917-1947
edited by Jurosh, A. G.,
Markushevich, A. L.
Rashevskiy, P. K.
Moscow-Leningrad, 1948

FOMIN, S. V.

K teorii rasshireniy topologicheskikh prostranstv. Matem. SB, 8 (50), (1940), 285-294.

SO: Mathematics in the USSR, 1917-1947
edited by Jurosh, A. G.,
Markushevich, A. L.
Rashevskiy, P. K.
Moscow-Leningrad, 1948

FOMIN, S. V.

O konechnykh invariantnykh merakh v dinamicheskikh sistemakh. Matem. SB, 12 (54), (1943), 99-108.

SO: Mathematics in the USSR, 1917-1947
edited by Juroch, A. G.
Markushevich, A. L.
Rashevskily, P. K.
Moscow-Leningrad, 1948

FOMIN, S.

Fomin, S. On the theory of dynamical systems with continuous spectrum. Doklady Akad. Nauk SSSR (N.S.) 67, 45–47 (1949). (Russian)

Let X be the space of all sequences $\{x_n\}$, $n=0, \pm 1, \pm 2, \cdots$, of real numbers and let T be the transformation defined by $T\{x_n\}=\{y_n\}$, where $y_n=x_{n+1}$. If a measure μ in X is invariant under T, the correlation function B of μ is defined, for every integer k, by $B(k)=\int x_k x_0 d\mu$. It is well known that a function B is the correlation function of some invariant measure μ if and only if it is positive definite, i.e., if and only if there is a measure m in the perimeter C of the unit circle such that $B(k)=\int_C \lambda^k dm(\lambda)$; the measure m is called the spectral function of μ. A measure μ is called normal if all its finite-dimensional sections are Gaussian. Theorem 1. If μ is a normal invariant measure in X, then a necessary and sufficient condition that the transformation T be weakly mixing is that the spectral function m of μ be nonatomic; hence, in particular, if m is nonatomic, then T is indecomposable. The spectral type (in the sense of Hellinger) of T is $M=\sum_{n=1}^{\infty} 2^{-n} m^{(n)}$ (where $m^{(0)}=m$ and $m^{(n+1)}=m'^{(n)}$ for $n=1, 2, \cdots$). Theorem 2. If M is any nonatomic measure in C such that $M^{(n)}$ is absolutely continuous with respect to M, $n=1, 2, \cdots$, then there exists a measure μ invariant under T and such that T is indecomposable and has spectral type M.

P. R. Halmos (Chicago, Ill.).

Source: Mathematical Reviews, 1950 Vol 11 No. 2

FOMIN, S. V.

Fomin, S. On dynamical systems in a space of functions. Ukrain. Mat. Zurnal 2, no. 2, 25–47 (1950). (Russian)

This paper contains mainly detailed proofs and discussions of results announced earlier by the author [Doklady Akad. Nauk SSSR (N.S.) 67, 435–437 (1949); these Rev. 11, 117]. Extensions of these results to the dynamical system $\Omega=(X, S_t)$ where X is the space of all real-valued functions $f(x)$ on the line and $S_t f(x)=f(x+t)$ for every t are also discussed.

V. N. Dowker (Manchester).

Source: Mathematical Reviews, Vol. 13 No. 3

FOMIN, S. V.

"Dynamic Systems of Invariant Measure." Sub 28 Nov 51, Moscow Order of Lenin State U imeni M. V. Lomonosov.

Dissertations presented for science and engineering degrees in Moscow during 1951.

SO: Sum. No. 480, 9 May 55.

FOMIN, S. V.

Gel'fand, I. M., and Fomin, S. V. Unitary representations of Lie groups and geodesic flows on surfaces of constant negative curvature. Doklady Akad. Nauk SSSR (N.S.) 76, 771–774 (1951). (Russian)

The authors consider the spectrum of a geodesic flow on a surface of constant negative curvature. They show that this spectrum in the case of a 2-dimensional surface is a Lebesgue spectrum (i.e. the spectral measures are all equivalent to the ordinary Lebesgue measure). In case the surface is compact they show that the spectrum is an enumerably multiple Lebesgue spectrum. The well known theorems of Hopf and Hedlund [cf. e.g. E. Hopf, Ber. Verh. Sächs. Akad. Wiss. Leipzig 91, 261–304 (1939); these Rev. 1, 243] on the metric transitivity and mixing properties of geodesic flows on surfaces of constant negative curvature follow as corollaries.

The method used to show that the spectrum is a Lebesgue spectrum is to represent the geodesic flow as a flow defined on the co-set space G/N of the group G of real matrices of order 2 with determinant 1 modulo a suitable discrete subgroup N. The flow S_t is defined by means of multiplication by $\begin{pmatrix} e^{-t} & 0 \\ 0 & e^{t} \end{pmatrix}$. The authors then appeal to the classification of irreducible unitary representations of the group G [cf. I. M. Gelfand and M. A. Naimark, Izvestiya Akad. Nauk SSSR. Ser. Mat. 11, 411–504 (1947); these Rev. 9, 495]. They show that for each type of these representations the spectrum is a Lebesgue spectrum. Their result follows as a consequence.

By similar methods one can compute the spectrum of a flow defined on the co-set space G/N of any locally compact Lie group G modulo a discrete subgroup N. The flow will be defined by a 1-parameter subgroup s_t of G provided the irreducible unitary representations of G are known. Modifying their method the authors deduce that the spectrum of a geodesic flow on a surface of constant negative curvature of arbitrary dimension is an absolutely continuous spectrum (i.e. the spectral measures are absolutely continuous set functions). Proofs are either omitted or only sketched.

Y. N. Dowker (Manchester).

Source: Mathematical Reviews, Vol. 13 No. 5

FOMIN, S. V.

Fomin, S. On dynamical systems with a purely point spectrum. Doklady Akad. Nauk SSSR (N.S.) 77, 29–32 (1951). (Russian)

Let L be a countable subgroup of the discrete additive group of real numbers. Let X be the character group of L. Let S_t be a 1-parameter group of transformations defined on X by $S_t\chi(\lambda)=e^{i\lambda t}\chi(\lambda)$, $\lambda\epsilon L$, $\chi(\lambda)\epsilon X$. Then (X, S_t) is called a canonical dynamical system. It is known [Halmos and von Neumann, Ann. of Math. (2) 43, 332–350 (1942); these Rev. 4, 14] that not only is a canonical system an ergodic dynamical system with a pure point spectrum but that every ergodic dynamical system with a pure point spectrum is isomorphic to a canonical dynamical system. In this paper the author studies some of the topological properties of dynamical systems with a pure point spectrum homeomorphic to a canonical system. Among the results obtained is the following: A necessary and sufficient condition for a dynamical system Ω to be homeomorphic to a canonical dynamical system is that Ω be compact, strongly ergodic and stable in the sense of Liapounoff. Here stability in the sense of Liapounoff means the equi-continuity of the 1-parameter group of homeomorphisms on Ω. It follows that there exists a complete set of continuous proper functions on every compact, strongly ergodic dynamical system stable in the sense of Liapounoff. A sufficient condition is also given for a dynamical system with a pure point spectrum to have a continuous mapping onto a canonical system with the same spectrum. This condition is given in terms of a relaxed stability condition. The results obtained in the paper are used to study trajectories on the surface of the torus. Proofs are only indicated.

Y. N. Dowker.

Smw

Source: Mathematical Reviews, Vol. 12 No. 3

FOMIN, S. V.

USSR/Mathematics - Dissertation Nov/Dec 52

"Doctoral Dissertations: Dynamic Systems With Invariant Measure," S. V. Fomin

"Usp Matemat Nauk" Vol 7, No 6 (52), pp 230-232

Abstract of Fomin's docotral dissertation. Dissertation was defended at a session of the Sci Council of Mechanicomathematical Faculty of Moscow State U held 28 Nov 51. Official opponents were Acad A. N. Kolmogorov; Prof N. V. Yefimov, Dr Phys-Math Sci; and V. A. Rokhlin, Dr Phys-Math Sci. The main results contained in the dissertation were expounded in the following works of the author: (1) "Finite

243T95

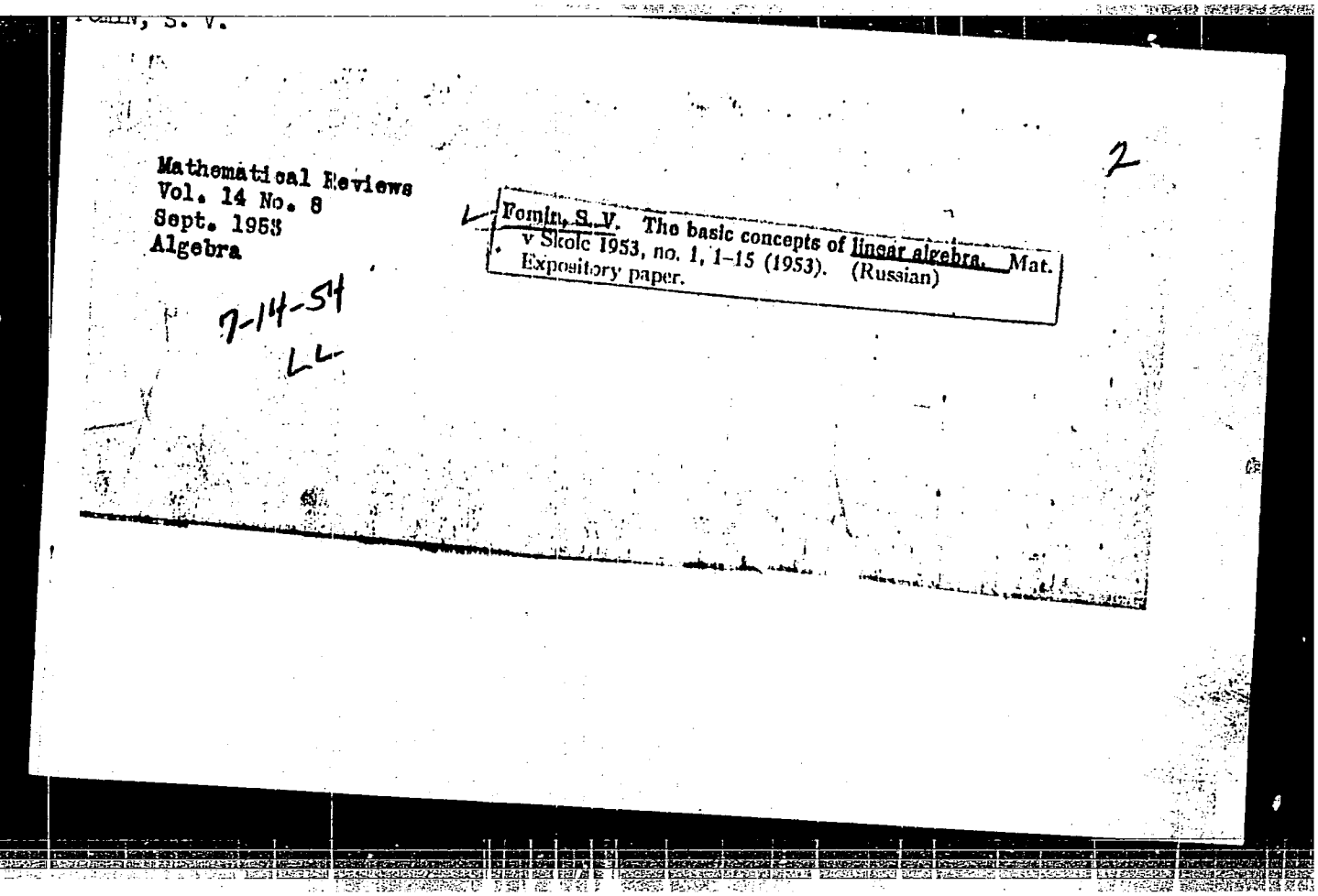
Invariant Measures in Dynamic Systems," Matemat Sbor 12(54), No 1 (1943). (2) "Measures Invariant Relative to a Certain Group of Transformations," Iz Ak Nauk SSSR, Ser Matemat, 14 (1950). (3) "Dynamic Systems in a Space of Functions," Ukrainskiy Matemat Zhurnal, 1, No 2 (1950). (4) "Unitary Representations of Lie Groups and Currents of Geodesics on Surfaces of Constant Negative Curvature," Dok Ak Nauk SSSR, 76, No 6 (1951) (in joint authorship with I. M. Gel'fand). (5) "Dynamic Systems With Purely Point Spectrum," Dok Ak Nauk SSSR, 77, No 1 (1951).

243T95

HALMOS, Paul Richard, 1914- ; FOMIN, S.V., redaktor; VASIL'KOV, D.A. [translator]

[Measure theory] Teoriia mery. Perevod s angliiskogo D.A.Vasil'kova. Pod red. S.V.Fomina. Moskva, Izd-vo inostrannoi lit-ry, 1953. 291 p. (MLRA 7:6)

(Topology)



FOMIN, S. V.

Mathematical Reviews
Vol. 14 No. 8
Sept. 1953
Algebra

7-14-54
LL

Fomin, S. V. The basic concepts of linear algebra. Mat. v Skole 1953, no. 1, 1–15 (1953). (Russian)
Expository paper.

2

1. KUROSH, A. G.; TOLSTOV, G. P.; FOMIN, S. V.

2. USSR (600)

4. Khinchin, Aleksandr Iakovlevich, 1894-

7. "Encyclopedia of elementary mathematics." Introduction by A. I. Markushevich. Book one "Arithmetic," book two "Algebra." Reviewed by A. G. Kurosh. Book three "Functions and limits." Reviewed by G. P. Tolstov, S. V. Fomin. Speeches of A. I. Fetisov, A. N. Kolmogorov, I. V. Proskuryakov, P. Ya. Dorf. P. S. Aleksandrov, I. M. Yaglom, A. S. Parkhomenko, A. I. Uzkov, V. V. Nemyskiy, A. P. Yushkevich. Letter from V. L. Goncharov. /P. S. Aleksandrov, A. I. Markushevich, A. Ya. Khinchin, eds./ Usp. mat. nauk 8, No. 1, 1953.

9. Monthly List of Russian Accessions, Library of Congress, June 1953, Uncl.

1. FOMIN, S. V.

2. USSR (600)

4. Spaces, Generalized

7. Introduction to the theory of linear spaces. G. E. Shilov. Reviewed by S. V. Fomin. Usp. mat. nauk 8, No. 2, 1953.

9. **Monthly List of Russian Accessions**, Library of Congress, April 1953. Unclassified.

FOMIN, S. V.

QA331.K73 TREASURE ISLAND BOOK REVIEW AID 777 - M

KOLMOGOROV, A. N., FOMIN, S. V.
ELEMENTY TEORII FUNKTSIY I FUNKTSIONALNOGO ANALIZA. Vypusk I METRICHESKIYE I NORMIROVANNYYE PROSTRANSTVA (Elements of the theory of functions and functional analysis. Issue I: Metrical and normed spaces). Izdatel'stvo Moskovskogo Universiteta, 1954. 153 p.

This textbook was written by A. N. Kolmogoroff, one of the outstanding Russian Scientist mathematicians, assisted by Professor S. V. Fomin, for students of graduate schools in the mathematical faculty of Russian universities.

The first chapter of this text is devoted to a brief exposition of some basic ideas of the theory of sets inwhich modern functional analysis is needed. A more extensive text on this subject of the introduction to the general theory of sets and functions has been written by another outstanding Russian mathematician, P. S. Alexandroff. This text is recommended by Kolmogoroff as an additional text to his first chapter (p. 5). For more extensive study of the whole field of the theory of sets, the fundamental book on this subject, the Grundzuge der Mengenlehre, written by F. Hausdorff,

KOLMOGOROV, A. N., FOMIN, S. V., Elementy teorii ... AID 777 - M

was translated from the German into Russian in 1936. [The first German edition of this book was reprinted in the U. S. A. in 1949].

The second, third and fourth Chapters on metrical spaces, linear normed spaces, and linear operational equations respectively, are written on the basis of the modern theory of functional analysis, in whose creation Kolmogoroff took part by writing many articles. The most famous of his articles include:

I. Uber die analytischen Methoden der Wahrscheinlichkitsrechnung. Math. Annalen, 104 (1931) 415-458.

II. Sulla forma generale di un processo stocustico omogneo. (Un-problema di Bruno de Finetti). Atti Accad. naz. Lincei, Rend., (6) 15 (1932) 805-808, 866-869.

III. Zur Normierbarkeit eines algemeinen topologischen linearen Raumes. Studia Math., 5 (1934) 29-33.

A very important supplement called "Generalized functions" was added to the third chapter - Linear normed spaces - .

KOLMOGOROV, A. N., FOMIN, S. V., Elementy teorii . . . . AID 777 - M

In this supplement the method of determining of generalized functions, constructed by the Russian scientist S. L. Sobolev was used. This method was published in several articles in Russia in 1935-1936 (p. 129).

Fomin, S. V.

Fomin, S. V. On generalized eigenfunctions of dynamical systems. Uspehi Mat. Nauk (N.S.) 10, no. 1(63), 173–178 (1955). (Russian) J - F/M

Let T be a C^∞ homeomorphism of a compact manifold Ω onto itself and let $S(\Omega)$ be the set of all infinitely differentiable functions on Ω. The author introduces the following definition: A linear functional ϕ_λ on $S(\Omega)$ is called a generalized eigenfunction, belonging to λ, of the dynamical system (Ω, T) if $\phi_\lambda(Uf) = e^{i\lambda}\phi_\lambda(f)$ for every $f \in S(\Omega)$, where Uf is defined by $Uf(p) = f(Tp)$. [For generalized functions, i.e. distributions, see L. Schwartz, Théorie des distributions, t. 1, 2, Hermann, Paris, 1950, 1951; MR 12, 31; 833.]

Let now Ω be the two-dimensional torus group and T one of its group automorphisms. Such an automorphism is known to be defined by an integer matrix $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ with determinant ± 1. The ordinary Lebesgue measure on Ω is invariant under T. It is known that if the characteristic roots of A have absolute value different from 1 then this dynamical system has a continuous spectrum. The author

(over)

FOMIN, S.V.

proves that in this case there exists a complete system of generalized eigenfunctions in the sense that $\phi(f)=0$ for each ϕ in the system only if $f=0$. The author remarks that the same considerations can be carried out for any dynamical system (Ω, T) with Ω an arbitrary compact commutative Lie group and T one of its group automorphisms.

Quite generally, if μ is an invariant measure on Ω, then to each ordinary eigenfunction $g_\lambda \in L_2(\mu)$ (satisfying $Ug_\lambda(p)=e^{\alpha}g_\lambda(p)$) there corresponds a generalized eigenfunction $\phi_\lambda(f)=\int_\Omega \overline{g_\lambda(p)}f(p)\,d\mu$. Taking a special dynamical system on the torus known to have a pure point spectrum and hence having a complete system of ordinary eigenfunctions, the author verifies that every generalized eigenfunction in this case corresponds to some ordinary eigenfunction.

Y. N. Dowker (London).

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8 MW

LFH

FOMIN, S. V.

Naimark, M. A., and Fomin, S. V. Continuous direct sums of Hilbert spaces and some of their applications. Uspehi Mat. Nauk (N.S.) 10, no. 2(64), 111–142 (1955). (Russian)

1 - F/W

This is an expository account of certain basic aspects of the subject described in the title. There are seven sections. Section one is introductory and contains references to a lecture of Kolmogorov in Moscow in 1944 and a 1948 dissertation of Adel'son-Velskiĭ in which parts of the theory of continuous sums were worked out in advance of the appearance of von Neumann's fundamental paper in 1949 [Ann. of Math. (2) 50, 401–485 (1949); MR 10, 548]. Apparently the only part of this work which is available in published form is a brief note of Adel'son-Velskiĭ [Dokl. Akad. Nauk SSSR (N.S.) 67, 957–959 (1949); MR 11, 115.] In this connection it should perhaps be mentioned that, except for minor changes, von Neumann's paper was actually completed in 1938. Section two contains the definition of continuous direct sum for the case in which all

(1)

Naimark, M.A., and Fomin, S.V.

component Hilbert spaces of the same dimension have been identified in advance so that one can consider L^2 functions from a measure space to a fixed Hilbert space. Section three is devoted mainly to a proof of the theorem setting up a one-to-one correspondence between direct sum decompositions of a Hilbert space and commutative weakly closed subalgebras of the algebra of all of its bounded linear operators. It also includes a treatment of the isomorphism between the algebra of all operators decomposed by the given decomposition of the Hilbert space and the commutator of the commutative algebra associated with the decomposition. The main theorem of section 4 asserts that if $\mathcal{A}$ is a family of decomposable operators $\lambda \to A_\lambda$ (here λ varies in the measure space associated with the decomposition and A_λ is an operator in the λth Hilbert space) and if the associated commutative algebra is maximal amongst commutative subalgebras of the commutator $\mathcal{A}'$ of $\mathcal{A}$ then for almost all λ the family of operators A_λ is an irreducible family in H_λ. The authors also write down an argument designed to establish the converse of this result. There is a gap at one point however and a simple example due to J. M. Cook shows that the converse is in fact false. In section five the main result of

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Naimark, M.A., and Fomin, S.V.

the preceding section is applied to prove that a unitary representation of a separable locally compact group is a continuous direct sum of irreducible ones. However this result is stated in a weaker form than that which is now known to be true [see, e.g., Mautner's paper, Trans. Amer. Math. Soc. 78, 371-384 (1955) MR 16, 692; and Godement's review of another paper of Mautner MR 13, 11]. In section six the main result of section four is used to prove a theorem on the decomposition of measures into ergodic parts. In section seven the theory of continuous direct sums is applied to obtain the Ambrose-Rohlin structure theorem for commutative H-systems = unitary rings.

G. W. Mackey (Cambridge, Mass.).

3/3

Smw

FOMIN, S.V.

"Normed rings" by M.A. Naimark. Reviewed by S.V.Fomin. Usp. mat.nauk 12 no.4:263-265 Jl-Ag '57. (MIRA 10:10)
(Functional analysis) (Naimark, M.A.)

16(1)

AUTHOR: Fomin, S.V. SOV/155-58-2-16/47

TITLE: On a Criterion of the Complete Additivity of the Measure in Topological Spaces (Ob odnom kriterii polnoy additivnosti mery v topologicheskikh prostranstvakh)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 2, pp 81-82 (USSR)

ABSTRACT: Theorem: Let the μ-additive measure in the topological space R be defined on a semiring γ with a unity, where to every $A \in \sigma$ and every $\varepsilon > 0$ there exists a closed set $F \subseteq A$, $F \in \sigma$, so that $\mu(A \setminus F) < \varepsilon$. *In order that* μ *is completely additive on* γ, *it is* sufficient that to every $\delta > 0$ there exists a bicompactum K_δ so that for an arbitrary covering of K_δ by the sets $A_n \in \sigma$ it holds

$$\sum_n \mu(A_n) > 1 - \delta \qquad (\mu(R) = 1).$$

There is 1 American reference.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

SUBMITTED: December 10, 1957

Card 1/1

16(1)

AUTHOR: Fomin, S.V. SOV/155-58-2-17/47

TITLE: On the Inclusion of the Integral With Respect to the Wiener Measure in the General Theory of the Lebesgue Integral (O vklyuchenii integrala po mere Vinera v obshchuyu teoriyu integrala Lebega)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 2, pp 83-85 (USSR)

ABSTRACT: Let μ_w be the measure of Wiener in the space C^0 of the functions $x(t)$, $x(0) = 0$ continuous on $[0,1]$. Let $F(x)$ be a functional on C^0 and $J = \lim_{n\to\infty} J_n$, where

$$J_n = \left(\frac{n}{\pi}\right)^{\frac{n}{2}} \int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\cdots\int_{-\infty}^{\infty} F_n(x_1,x_2,\ldots,x_n)\, e^{-nx_1^2-\sum_{i=1}^{n-1} n(x_{i+1}-x_i)^2}\, dx_1 dx_2 \ldots dx_n$$

be the integral of Wiener of the functional $F(x)$.
Theorem: If the functional $F(x) \geq 0$ is continuous and if there

Card 1/2

On the Inclusion of the Integral With Respect to the Wiener Measure in the General Theory of the Lebesgue Integral

SOV/155-58-2-17/47

exists $\lim_{n\to\infty} J_n$, then there also exists the integral

$$\int_{C^{(o)}} F(x)\,d\mu_w$$

(in the Lebesgue sense) and

$$\int_{C^{(o)}} F(x)\,d\mu_w \leq J.$$

There are 2 references, 1 of which is Soviet, and 1 English.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute of Nuclear Research)

SUBMITTED: December 10, 1957

Card 2/2

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SOV/155-58-6-26/36

~~16(1)~~ 16.7600

AUTHORS: Samarskiy, A.A., Fomin, S.V.

TITLE: On the Mathematical Investigation of Sorption- and Desorption Processes of Gases (Quasi-stationary Case)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 6, pp 158-168 (USSR)

ABSTRACT: Through a tube which is filled with an absorbing medium there is sent a mixture of n gases with given concentrations. The process is a purely physical one (absorption of the single components by the medium), chemical interactions do not take place. The velocity v of the mixture is so high that diffusion is negligible. The concentration c_i of the free gas components and the set a_i of the absorbed gas is sought at an arbitrary moment t at an arbitrary point of the tube. According to Ref 1 the process is described by 2n differential equations which are linear with respect to the derivatives and non-linear with respect to the sought functions a_i, c_i themselves. Under the assumption that the process

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On the Mathematical Investigation of Sorption- and *Desorption Processes of Gases (Quasi-stationary Case)* SOV/155-58-6-26/36

takes place under constant temperature and that the so-called kinetic coefficient is infinitely large, the authors succeed in reducing the originally partial system to a system of n ordinary differential equations of first order. The system is completed by initial- and boundary conditions which correspond to three cases: sorption, desorption and removal of some gases by the others. The authors carry out a qualitative investigation of the obtained boundary value problems and then under further (physically evident) assumptions they describe a method which renders possible the solution of the problem.
There is 1 Soviet reference.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: October 19, 1958

Card 2/2

AUTHORS: Maslov, V.P., Samarskiy, A.A., Fomin,S.V., SOV/42-13-6-31/33
and Shirokov, Yu.M.

TITLE: I.I.Gol'dman and V.D.Krivchenkov, Collection of Problems for Quantum Mechanics, Moscow, Gostekhizdat, 1957, 275 Pages, 15000 Copies, 5 Rub. 15 Kop. (I.I.Gol'dman i V.D.Krivchenkov, Sbornik zadach po kvantovoy mekhanike, M., Gostekhizdat, 1957, str. 275, tirazh 15000 ekz., tsena 5 r. 15 kop)

PERIODICAL: Uspekhi matematicheskikh nauk, 1958,Vol 13,Nr 6,pp 234-237 (USSR)

ABSTRACT: This is a very appreciating review of the above book. For the further editions it is commended to consider the group-theoretical methods of quantum mechanics and to give instructions for some difficult problems.

Card 1/1

AUTHOR: Fomin, S.V. SOV/42-13-5-15/15

TITLE: ~~Lyubarskiy~~,G.Ya: Group Theory and its Application in Physics (Lyubarskiy G.Ya: Teoriya grupp i yeye primeneniye v fizike)

PERIODICAL: Uspekhi matematicheskikh nauk, 1958, Vol 13, Nr 5, pp 239-241 (USSR)

ABSTRACT: This is a very extensive discussion of the book of Lyubarskiy published in 1957. The author mentions plenty of material. It is objected to the tightness of the representation so that it can scarcely be comprehended by beginners. The author hopes that the next editions will remove this deficiency.

Card 1/1

USCOMM-DC-61126

AUTHOR: Fomin, S.V. SOV/42-13-6-32/33

TITLE: Correction (From the Letters to the Editor) (Popravka (Iz pisem v redaktsiyu))

PERIODICAL: Uspekhi matematicheskikh nauk, 1958, Vol 13, Nr 6, p 238 (USSR)

ABSTRACT: The author withdraws his assertion that in the book of G.Ya. Lyubarskiy "Group theory and its application in physics" the Eulerian angles are introduced incorrectly. It concerns only a misprint.

Card 1/1

AUTHOR: Fomin, S.V.

SOV-20-121-2-11/53

TITLE: On the Question on the Connection Between the Proximity Spaces and the Bicompact Extensions of Completely Regular Spaces (K voprosu o svyazi mezhdu prostranstvami blizosti i bikompaktnymi rasshireniyami vpolne regulyarnykh prostranstv)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 2, pp 236-238 (USSR)

ABSTRACT: From the general theory of commutative normed rings the author deduces the result of Yu.M.Smirnov [Ref 1] on the natural one-to-one correspondence between all bicompact extensions of a completely regular space and all proximity spaces for which R is the carrier and the topology of which corresponds to the topology of R.
There are 3 Soviet references.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute of Nuclear Research)

PRESENTED: March 18, 1958, by P.S.Alaksandrov, Academician
SUBMITTED: February 3, 1958

Card 1/1

FOMIN, Sergey Vasil'yevich; MOLOZOVA, I.Ye., red.

[Number systems] Sistemy schisleniia. Moskva, Nauka, 1960. 40 p. (Populiarnye lektsii po matematike, no.40) (MIRA 17:6)

KOLMOGOROV, Andrey Nikolayevich; FOMIN, Sergey Vasil'yevich; ZHELOBENKO, D.P., red.; YERMAKOV, M.S., tekhn.red.

[Elements of the theory of functions and of functional analysis] Elementy teorii funktsii i funktsional'nogo analiza. Moskva, Izd-vo Mosk.univ. No.2. [Measure, Lebesgue integral, Hilbert space] Mera, integral Lebega, gil'bertovo prostranstvo. 1960. 118 p. (MIRA 13:7)

(Functions) (Functional analysis)

FOMIN, S.V., red.; KOPYLOVA, A.N., red.; KOLSENIKOVA, A.P., tekhn.red.

[International Mathematical Congress, Amsterdam, 1954. Summary reports] Mezhdunarodnyy matematicheskiy kongress v Amsterdame 1954 g. Obzornye doklady] Moskva, Gos.izd-vo fiziko-matem. lit-ry, 1961. 338 p. Translated from the English and the French. (MIRA 14:4)

1. International Mathematical Congress, Amsterdam, 1954. (Mathematics--Congresses)

GEL'FAND, Izrail' Moiseyevich; FOMIN, Sergey Vasil'yevich; POLOVINKIN, S.M., red.; TUMARKINA, N.A., tekhn. red.

[Calculus of variations] Variatsionnoe ischislenie. Moskva, Gos. izd-vo fiziko-matem. lit-ry, 1961. 228 p. (MIRA 14:12)
(Calculus of variations)

S/020/63/149/003/004/028
B112/B180

AUTHORS: Maykov, Ye. V., Fomin, S. V.

TITLE: Difference schemes and measures in functional space

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 149, no. 3, 1963, 525 - 528

TEXT: The Cauchy problem $\partial u/\partial t = Lu$, $u(0,x) = \varphi(x)$, (1), where L is a linear differential operator and $\varphi(x)$ is a continuous bounded function, is written in the difference form $u^m_{i+1,k} = \sum_{j=-\infty}^{\infty} a^m_{ijk} u_{ij}$, $u^m_{ok} = \varphi^m_k$ (7).

This system may be solved in the form $u^m(t,x) = \sum_{\gamma(\tau)\subset \hat{\Omega}_m} \varphi^m_{k_0} p_m[\gamma(\tau)]$ (8).

In the functional space $\Omega = \Omega_0^{t,x}$ the sequence of measures $\mu_m(A) = \sum_{\gamma(\tau)\in A} P_m[\gamma(\tau)]$ (9) is introduced for any $A\subset\Omega$. The following two theorems are derived: 1. If the difference scheme is uniformly

Card 1/2

Difference schemes and ...

stable, then the corresponding sequence of measures is T-convergent.
2. The sequence (9) converges weakly if and only if it is T-convergent and compact.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: October 10, 1962, by P. S. Aleksandrov, Academician

SUBMITTED: September 18, 1962

Card 2/2

VISHIK, M.I.; KOLMOGOROV, A.N.; FOMIN, S.V.; SHILOV, G.E.

Izrail' Moiseevich Gel'fand, 1913- ; on his 50th birthday.
Usp. mat. nauk 19 no.3:187-205 My-Je '64.
(MIRA 17:10)

MASLOV, V.P.; FOMIN, S.V., red.

[Perturbation theory and asymptotic methods] Teoriia vozmushchenii i asimptoticheskie metody. Moskva, Izd-vo Mosk. univ., 1965. 549 p. (MIRA 19:1)

BUDAK, Boris Mikhaylovich; FOMIN, Sergey Vasil'yevich; [illegible], N.A., red.; GORUKOV, Yu.A., red.; TIKHONOV, A.N., red.

[Multiple integrals and series] Kratnyye integraly i riady. Moskva, Nauka, 1965. 607 p. (MIRA 18:11)

DALETSKIY, Yu.L.; FOMIN, S.V. (Moscow)

Generalized measures in functional spaces. Teor. veroiat. i ee prim. 10 no.2:329-343 '65. (MIRA 18:6)

PUCHIK, K.F.; FIMUSHKIN, V.N.; SOKOLOV, P.V.; SAFRONOV, S.I., Geroy Sovetskogo Soyuza; NOVIKOV, N.I.; FOMIN, S.Ye., tekhnik samoleta

We're proud of your achievement, IUrii! Kryl.rod. 12 no.5:2-3 My '61. (MIRA 14:7)

1. Nachal'nik Saratovskogo aerokluba (for Puchik). 2. Zamestitel' nachal'nika po politicheskoy chasti Saratovskogo aerokluba (for Fimushkin).
(Gagrin, IUrii Alekseevich, 1934-)

FOMIN, T. I.

TECHNOLOGY

(Six years without factory repair). Moskva, Morskoi transport, 1951.

Monthly List of Russian Accessions, Library of Congress, November 1952.
Unclassified.

S/043/62/000/001/001/009
D299/D303

24.4400

AUTHORS: Buslayev, V., and Fomin, V.

TITLE: On the inverse scattering-problem for the one-dimensional Schrödinger equation on the entire x-axis

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya matematiki, mekhaniki i astronomii, no. 1, 1, 1962, 56 - 64

TEXT: Schrödinger's equation

$$Ly \equiv - y'' + q(x)y = k^2 y \qquad (0.1)$$

is considered on the x-axis ($-\infty$ x ∞); the potential q(x) is taken as a real, locally integrable function for which

$$\int_0^{\infty} t|q(t)|dt \leq A, \quad \int_{-\infty}^{0} |t||q(t) - C^2|dt \leq A \quad (A < \infty, C > 0). \qquad (0.2)$$

Under such conditions, it is possible to establish the existence of solutions $\psi_1(x, k)$ and $\psi_2(x, k)$ to equation (0.1), with asymptotic

Card 1/6

values of type

$$\psi_1(x, k) \sim \begin{cases} S_{11}(k)\, e^{ikx} + o(1), & x \to \infty, \quad |k| > 0 \\ e^{ik_1 x} + S_{12}(k)\, e^{-ik_1 x} + o(1), & x \to -\infty, \quad |k_1| > 0 \end{cases} \tag{0.3}$$

$$\psi_2(x, k) \sim \begin{cases} e^{-ikx} + S_{11}(k)\, e^{ikx} + o(1), & x \to +\infty, \quad |k| > 0 \\ S_{22}(k)\, e^{-ik_1 x} + o(1), & x \to -\infty, \quad |k_1| > 0 \end{cases} \tag{0.4}$$

where $k_1 = \sqrt{k^2 - c^2}$. The table of coefficients $S_{ij}(k)$ $(i, j = 1, 2)$ is called the S-matrix of equation (0.1). The properties of the S-matrix are investigated as well as the construction of q(x) from the S-matrix (the inverse scattering-problem). The properties of the S-matrix are formulated in Theorem 1: The coefficients $S_{ij}(k)$ are continuous functions of k, whereby $S_{ij}(k) = S_{ij}(-k)$. With large /k/,

$$S_{12}(k) = O\left(\frac{1}{|k|}\right), \quad S_{21}(k) = O\left(\frac{1}{|k|}\right), \quad S_{11}(k) = 1 + O\left(\frac{1}{|k|}\right), \quad S_{22}(k) = 1 + O\left(\frac{1}{|k|}\right). \tag{1.12}$$

Card 2/6

On the inverse scattering-problem ...

The coefficients $S_{11}(k)$ and $S_{22}(k)$ are the limiting values of functions which are regular for Im $k \geq 0$, with the exception of a finite number of points $i\varkappa_l$, where they have simple poles with residues

$$\operatorname{Res} S_{22}(k)|_{k=i\varkappa_l} = i\gamma_l, \quad \operatorname{Res} S_{11}(k)|_{k=i\varkappa_l} = i\gamma_l \frac{\varkappa_l}{\sqrt{\varkappa_l^2 + C^2}} \tag{1.13}$$

$$\gamma_l = \left[\int_{-\infty}^{\infty} f_1(x, i\varkappa_l) f_2(x, i\varkappa_l)\, dx \right]^{-1}.$$

On the real axis, the following equations hold:

$$k_1 S_{22}(k) = k S_{11}(k), \quad \sqrt{\frac{k}{k_1}} S_{11}(k) S_{21}(-k) + \tag{1.14}$$

$$+ \sqrt{\frac{k_1}{k}} S_{12}(k) S_{22}(-k) = 0;$$

Using the properties of the S-matrix, expressed by the theorem, it is possible to construct the S-matrix by means of the coefficients $S_{21}(k)$ and the poles of $S_{22}(k)$. The relation

On the inverse scattering-problem ...

$$\psi_2(x, k) = S_{21}(k)f_1(x_1, k) + f_1(x, -k), \quad \text{Im } k = 0, \qquad (2.1)$$

considered as the boundary-value problem for the pair of functions $f_1(x, k)$ and $\psi_2(x, k)$, can be used to solve the inverse problem.

The boundary-value problem reduces to the integral equation for the kernel of the transformation operator $A_1(x, y)$:

$$A_1(x, y) + \Omega_1(x+y) + \int_x^\infty A_1(x, t)\,\Omega_1(t+y)\,dt = 0, \quad x < y, \qquad (2.3)$$

where

$$\Omega_1(t) = F_1(t) + \sum_{l=1}^{m} m_l^{(1)} e^{-\varkappa_l t}, \qquad (2.4)$$

$$S_{21}(k) = \int_{-\infty}^{\infty} F_1(t)\,e^{ikt}\,dt.$$

Analogously, for $A_2(x, y)$:

$$A_2(x, y) + \Omega_2(x, y) + \int_{-\infty}^{x} A_2(x, t)\,\Omega_2(y + t)\,dt = 0, \; x \geqslant y. \qquad (2.8)$$

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On the inverse scattering-problem ...

Theorem 2 states the properties of the Fourier transforms $F_1(t)$ and $F_2(t)$ of the functions $S_{21}(k)$ and $S_{12}(k)$. The initial data of the inverse problem are the following: The function $\Omega_1(t)$ is determined by formula (2.4), provided the coefficient $S_{21}(k)$ is given as well as the point spectrum of the operator L: $-\kappa_1^2$ and the m positive constants $m_1^{(1)}$. It is assumed that S_{21} has the properties of Theorem 1, and that its Fourier transform $F_1(t)$ has the properties of Theorem 2. The totality of conditions imposed on the initial data are denoted by Y. The solution to the inverse problem is formulated in Theorem 3: If the initial data of the inverse problem satisfy conditions Y, then: 1) The functions f_1 and f_2 (transformation operators) satisfy differential equations of type (0.1), the potentials being locally integrable. The solutions to Eq. (0.1) tend asymptotically to unity. 2) With Im k = 0,

$$S_{11}(k)f_1(x, k) = f_2(x, -k) + S_{12}(k)f_2(x, k), \quad /k/ > C \qquad (3.3)$$

Card 5/6

$$S_{22}(k)f_2(x, k) = f_1(x, -k) + S_{21}(k)f_1(x, k), \quad /k/ > 0. \quad (3.3)$$

3) From 1) and 2) there follows the existence of a unique integrable potential $p_1(x) = p_2(x)$, satisfying conditions (0.2) and the corresponding initial data. A proof to this theorem is given. There are 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: N. Levinson, On the uniqueness of the potential in a Schroedinger equation for a given asymptotic phase. Kgl. Danske Videnskab Selskab mat.-fys. medd., 25, 9, 1949.

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